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Practitioner's Docket No. LAR 16307-1-SB

PATENT APPLICATION

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of: Jeffrey D. Jordan et al.

Application No.: 10/056,845

Examiner: Cam N. Nguyen

Filed: January 22, 2002

Art Unit: 1754

For: Methodology for the Effective Stabilization of Tin-Oxide-Based Oxidation/Reduction Catalysts

Commissioner for Patents

P.O. Box 1450

Alexandria, VA 22313-1450

23351

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Response to Examiner - 6 pages (to include this certificate of facsimile)

4/27/2005

Date

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Application No. 10/056,845
Amendment dated April 27, 2005
Reply to Office Action dated February 9, 2005

SUPPLEMENTAL
AMENDMENT UNDER 37 C.F.R. § 1.116

Sir:

In further response to the Office Action of February 9, 2005, please consider this Supplement Amendment in conjunction with the Amendment dated April 8, 2005. Please amend the above-identified application as follows:

Amendment to the Specification is reflected on page 3 of this paper.

Remarks/Arguments begin on page 5 of this paper.

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AMENDMENT TO SPECIFICATION

Please replace two consecutive paragraphs, the first beginning page 4 and the second ending on 5, with the following two paragraphs

The catalyst composite can be created by mixing metal-oxide precursor solutions, either neat or in a compatible solvent, and applying the solution to a substrate. In one embodiment, the metal-oxide precursor solution is tin, cerium, zirconium-(II) ethyl hexanoate and the compatible solvent is ~~metal~~ methyl ethyl ketone [MEK]. In this embodiment the mass ratio for the tin: cerium: zirconium is 1.0: 0.5: 0.5. For automotive applications, the substrate can, for example, be a honeycomb-structured ceramic or metal and the coating application can be performed by a single dip-deaerate-dip sequence. Following the application, the catalyst coating can be thermally treated through various programs to eliminate solvent and convert the mixed-metal precursor solution to a mixed-metal oxide coating. In at least one embodiment, promoter metal species, selected from the group consisting of oxides of the metals of the transition series of the periodic table of elements (e.g., iron, cobalt, nickel) are then applied by dipping in aqueous metal nitrate solutions followed by an additional thermal treatment. Noble metal species, selected from the group consisting of platinum, palladium, gold, silver, and rhodium, are then applied from aqueous solutions directly to the coating channels quantitatively. This can be done by using a Pasteur pipette followed by a final thermal treatment. In at least one embodiment, the noble metal comprises from about 1 to about 50 weight percent, based on the total weight of the catalyst and the metal oxides comprise from about 50 to about 99 weight percent, based on the total weight of the catalyst. The promoter may be present in an amount sufficient to provide from about 1 to about 12 atom percent of promoter metal to tin metal.

In the conventional mode of catalyst preparation, multiple layers of the inactive support (e.g., alumina) are applied to a substrate material (e.g., cordierite, silica gel) by successive wash coating of a slurry of particles dispersed in a solvent (e.g., alcohol). The mechanism for adherence is simple absorption of material, relying heavily on the predilection of smaller particles to penetrate and absorb to the porous regions of the substrate to form an anchor for

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subsequent layers. In contrast, the mixed metal (e.g., Sn, Ce, Zr) precursor solutions can readily penetrate the porous cracks and fissures in the substrate material, chemically bonding to the surface through a condensation mechanism with surface hydroxyl groups. The result of this approach is significant improvements in catalyst adherence, catalytic efficiency/surface area, and durability (temperature stability). In at least one embodiment, the reducible metal oxide active layer is produced by applying a homogeneous solution of tin ethylhexanoate (SnEH), cerium (II) ethylhexanoate (CeEH), and zirconium (II) ~~ethylhexanoate~~ ethylhexanoate (ZrEH) to the substrate and oxidizing the absorbed and adsorbed SnEH/CeEH/ZrEH to a tin oxide (SnO_2)/ceria/zirconia composite by heating to high temperature (550 – 800 centigrade). This produces catalyst materials that are stable under high-temperature operation in reducing environments.

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REMARKS/ARGUMENTS

This Supplement Amendment is to be considered in conjunction with the Amendment filed April 8, 2005. It is being filed solely for the purpose of correcting two typographical errors which have only now been noted by the applicants. These changes, in combination with the previously filed Amendment, are believed to place the application in condition for allowance and/or in better condition for consideration on appeal.

Amendment to the Specification:

The specification has been amended herein to correct a typographical error so as to change a reference to "metal ethyl ketone [MEK]" to "methyl ethyl ketone [MEK]." It is respectfully submitted that it is well known by those skilled in the art that "MEK" is the notation for "methyl ethyl ketone."

The other amendment made herein is to correct a typographical error so as to change "zirconium (II) ethylhexanoate (ZrEH)" to "zirconium (II) ethylhexanoate (ZrEH)." It is respectfully submitted that those skilled in the art would realize that ZrEH is the notation for zirconium (II) ethylhexanoate

Based on the above, it is submitted no new matter has been added.

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CONCLUSION

It is submitted that the Applicants have submitted new and unique Stabilized Tin-Oxide-Based Oxidation/Reduction Catalysts. In view of the above, it is submitted that the application is in condition for allowance. Therefore, it is requested that a Notice of Allowance be issued at an early date.

Respectfully submitted,



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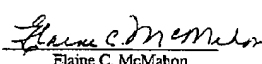
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